# IDEM=s Surface Water Quality Assessment Program

## Fish Community Sampling Program

### Program Objective

The objective of this program is to assess water quality using resident fish communities as a tool to monitor the biological integrity of a stream. This type of monitoring aids in the classification of streams that exhibit very poor to excellent water quality conditions as well as habitat availability and quality. Because most fish have a life span of greater than three years fish community monitoring can detect areas of degradation that have occurred over an extended period of time. Fish community sampling is an integral part of the Watershed Based Monitoring Program (see the *Watershed Monitoring Program* fact sheet, IDEM 32/01/001/1998 for details on this program).

### Program Participants

This program is operated through the efforts of the Biological Studies Section with the aid of citizens, local governments, the Indiana Department of Natural Resources, U.S. Fish and Wildlife Service, and U.S. Environmental Protection Agency (USEPA) Region 5, Chicago, Illinois, and USEPA National Health and Environmental Effects Research Laboratory, Corvallis, Oregon.

### Program Description

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| Media: | Surface waters; rivers and streams |
| Study Area: | Statewide |
| Site Selection Type: | Various methods; Historically, from bridges that offered easy access to the sampling locations. Areas with obvious degradation were avoided if possible. The focus of study was based on Ecoregions (Omernik and Gallant 1988). Currently, sites are selected randomly (probabilistic design) from within major watershed boundaries. An attempt is made to sample all sites within the watershed regardless of degradation. The focus of study is based on major watersheds delineated by U.S. Geological Survey, Hydrologic Unit Codes. |
| Sampling Sites: | 30-50 sampling sites per watershed, one or two watersheds per year. |
| Sampling Frequency: | Once per site, 10 percent (approximately 3-5) of the sites per watershed basin are sampled again within the same year to account for field technique accuracy. |
| Data Collected: | Fish community Index of Biotic Integrity (IBI), habitat information using the Ohio Environmental Protection Agency's Qualitative Habitat Evaluation Index (QHEI), and in-situ water chemistry. |

## Program Product(s)

- Provide information for the Section 305(b) report
- Support for Section 303(d), list of impaired waters
- Technical reports on fish community trends and assessments
- Aid in the development of criteria for biological integrity
- Support the Environmental Performance Partnership Agreement (EnPPA)
- Cooperation and corroboration with program participants on issues of scientific importance

## Technical Notes

The Index of Biotic Integrity (IBI) is used to calculate the results of fish community data. The IBI is composed of 12 metrics that assess the communities species and trophic composition (feeding and reproductive guilds) and fish condition and health. The total IBI score, integrity class and attributes help define fish community characteristics (see chart below). When fish community data (IBI) is plotted against habitat data (QHEI) areas of impairment, as well as areas with excellent water quality and habitat, become clear.

| Total IBI Score | Integrity Class | Attributes |
|---|---|---|
| 58-60 | Excellent | Comparable to pristine conditions, exceptional assemblage of species. |
| 48-52 | Good | Decreased species richness, intolerant species in particular: sensitive species present. |
| 40-44 | Fair | Intolerant and sensitive species absent; skewed trophic structure. |
| 28-34 | Poor | Top carnivores and many expected species absent or rare: omnivores and tolerant species dominant. |
| 12-22 | Very Poor | Few species and individuals present; tolerant species dominant; diseased fish frequent. |
| | No fish | Repeated sampling finds no fish. |

Karr et al., 1986.

### References Cited

Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J Schlosser. 1986. Assessing biological integrity in running waters: a method and its rationale. Ill. Nat. Hist. Surv. Sp. Publ. 5. 28 p.

Omernik, J.M. and A.L. Gallant. 1988. Ecoregions of the upper Midwest States. USEPA, ERL, Corvallis, OR. EPA/600/3- 88/037.

Seaber, P.R., S.P. Kapinost, and G.L. Knapp. 1984. State hydrological unit maps. U.S. Geological Survey Open-file report. 84-708 pp.

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| **IDEM Information**:<br>(317) 233-1044 or<br>800-451-6027<br>800-743-3333(TDD)<br>toll-free for Indiana residents<br><br>**EnviroLine:**<br>(317) 232-8603 or<br>800-451-6027 toll-free for Indiana residents<br><br>**Fax on Demand:**<br>800-726-8000<br><br>**Internet:**<br>www.state.in.us/idem | **For More Information on IDEM's Office of Quality…**<br><br>**Assessment Branch** (Surface water quality: river, streams and lakes) Shadeland Office, Indianapolis (317) 308-3173<br><br>**Permitting Branch** (NPDES permits) Indiana Government Center North, Indianapolis (317) 232-8675<br><br>**Compliance Branch** (facilities assistance, inspections and compliance) Indiana Government Center North, Indianapolis (317) 232-6770<br><br>**Drinking Water Branch** (Public water supply and ground water protection) Shadeland Office, Indianapolis (317) 308-3280<br><br>**Planning & Restoration Branch** (Water quality standards/rules, grants and loans) Indiana Government Center North, Indianapolis (317) 233-8488 |